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ORNAMENTAL TREES

FOR

MASSACHUSETTS PLANTATIONS.

BY

JOHN ROBINSON
OF THE ARNOLD ARBORETUM.

READ AT THE WINTER MEETING OF
THE STATE BOARD OF AGRICULTURE,
DECEMBER, 1880.

[FROM THE TWENTY-EIGHTH ANNUAL REPORT OF THE SECRETARY OF THE STATE BOARD OF AGRICULTURE.]

BOSTON:
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ORNAMENTAL TREES.

BY MR. JOHN ROBINSON.

In preparing this paper upon ornamental trees for Massachusetts plantations, it has been the endeavor of the writer to call attention to the physical conditions under which the trees best adapted to our wants are found, — a side of the question too often neglected both by the planter and the essayist. Very little need be said regarding the trees individually, excepting those which may illustrate forcibly such points as seem to require it.. In order to make a proper selection of trees for ornamental or economic planting, something more is necessary than a mere fancy for the trees selected. A knowledge is required of the species which will, under peculiar conditions, endure the longest, and prove, at the end of a generation or two, that the choice was wisely made. Failing in this, disappointment must result, and others will be called upon to do again the work which a proper knowledge of the subject might have permanently accomplished at first, with no greater outlay.

The distribution of trees over the earth's surface is wholly depending upon the distribution of rainfall, and the temperature, locally varied by the condition and composition of the soil. Where there is a generous rainfall, and moderate, equable temperature, a luxuriant forest will thrive, varying, of course, from the profuse vegetation of the tropics to the stunted forms of the polar regions and the alpine tops of high mountains. In North America a great belt of forest extends down the Pacific coast from Alaska to California, across to Newfoundland, and thence south to the Gulf of Mexico. The treeless regions are the coast of California below the thirty-fifth degree of latitude, the plains and prairies east and south-west of the Rocky Mountains, and the great arid deserts which occupy that vast region which lies south of the Blue Mountains of Oregon and between the high Sierras and the Rocky Mountains, extending far south into Mexico, and which is known as the "Great Basin." This interior dry region is caused by the westerly winds blowing from the Pacific Ocean, and the southerly and easterly winds blowing from the Gulf of Mexico, depositing their moisture on the intervening mountains, which shut it in from the influence of the ocean. This is not the time, nor will space permit us, to give even an outline of the theories which are advanced to account for the present distribution of forest-trees. For countless generations, species have been slowly adapting themselves to their fitting places. Natural selection, and the survival of the fittest forms for the position they are to occupy, have placed on the earth's surface the exact species in the exact positions best suited for their development. In different climates and in different situations the particular variety, too, of the species that can best sustain the local conditions to which it must be subjected, is found. This is illustrated very clearly by some of our own forest-trees. The most widely distributed of North-American coniferæ, and one little changed in appearance, is the red cedar (*Juniperus Virginiana*). This tree is found as far north as latitude fifty, and south to the Gulf of Mexico, extending from the Atlantic to the Pacific. At its extreme northern limit it is only a shrub; on our own sterile hills it becomes a rugged tree, and is of no little economic value for many purposes; while in the warmer climates of Florida the same species is banished to the swamps, and furnishes that clear, soft wood used the world over in the manufacture of the best lead pencils. The Douglas spruce, which is one of the most valuable of American forest-trees, has a less extended range. It is common from British Columbia to Mexico, extending east into the Rocky Mountains of Colorado. The most interesting point is this: children inherit the characteristics of their parents; and even the seeds of trees carry with them and perpetuate the constitutions, delicate or strong, that the region in which they were produced developed in the parent plants. The seeds of the Douglas spruce from the Rocky Mountains produce trees which are as hardy here in New England as the cedars on our hillsides; while plants raised from the seeds of the same tree growing in the milder, moister climate of the Pacific States, fail entirely to adapt themselves to our New-England climate, as, indeed, do all the trees, with hardly an exception, from the region west of the Rocky Mountains. Therefore, having an insufficient knowledge of the distribution of a species, we cannot say that any particular tree is hardy, and will serve our purposes as material for forest or ornamental planting; but we must know, in the case of widely distributed species, the exact physical conditions of the particular locality from which the individual was obtained.

Massachusetts herself, wonderfully rich in arborescent species, belongs botanically to the Appalachian flora, — a flora which contains a larger variety of trees than that of any region of similar extent in the north temperate zone, with the single exception of Western Asia.

The Appalachian flora, which embraces the plants of Canada and all the Northern States east of the Mississippi River, descends along the Alleghany Mountains as far as Georgia, and, in the high mountains of North Carolina, reaches, in the multiplication of tree species, its greatest development: here, in a comparatively small area, are more than twice as many species of trees as grow naturally in all the continent of Europe.

The climate of this region is, from its great altitude, not unlike that of New England; and the trees of all the Appalachian flora, and especially those of the high Southern mountains, thrive here in Massachusetts. The trees of this flora are beautiful and varied; and, if we wish to secure to our plantations a certainty of permanent success, we must turn to our own forests for our best material, and avail ourselves of the benefit of Nature's own selection.

Our New-England forests are everywhere famed for the brilliancy of their autumnal foliage; and certainly, for several weeks, longer than any flowering tree retains its beauty of blossom, the maples, ashes, oaks, and many other trees, display a magnificence unequalled by any show of flowers. Even without considering this, our native trees are superior, for our purposes, to their too often-planted European allies.

With what has been previously shown regarding the suitability of native species to the climate in which they grow, and the unusually large number of species from which we have to draw, it seems hardly necessary to argue that we need not look far to find the region from which to select the best trees for our lawns, woods, or streets.

One of the greatest difficulties in the way of obtaining native species is the scarcity of such material in our nurseries. Most American nurseries contain at best few American trees, being chiefly filled with the more easily procured European plants, which, however attractive they may appear in their young state, are generally unsatisfactory here at maturity; European species, as a rule, having, after a test of more than fifty years, failed, in most cases, to make fine trees suitable to our climate, or in any way equal to their American relatives. This error in selection renders it too often desirable to replant many of the older estates in the neighborhood of Boston; and it is a source of general regret, that, when Central Park in New York was commenced, few other than common European trees could be procured in the nurseries to plant there. The visitors to this great pleasure-ground are therefore prevented from becoming familiar with the beautiful trees of our own forests.

Comparing the allied trees of the American and European forests, it will be found, that, when such comparison can be fairly made, the advantage for our purposes is invariably in favor of the American tree.

The white pine (*Pinus Strobus*), while it is for practical purposes the most valuable of the New-England pines, is at the same time much more beautiful than any pine capable of withstanding the rigor of our climate. The European Scotch pine (*Pinus sylvestris*) and the Austrian pine (*Pinus Laricio* var. *Austriaca*) are frequently planted, although they have already proved themselves unable to attain maturity in our climate.

The red or Norway pine (*Pinus resinosa*), — very seldom seen in cultivation, although common in the wild state farther north, — while resembling somewhat the Austrian pine in appearance, is its superior here in beauty, usefulness, and duration of life; and even our pitch-pine (*Pinus rigida*) is in some localities a very attractive and useful tree, which can be planted with considerable profit on sandy and exposed barrens, like some portions of Cape Cod. The Norway spruce (*Picea excelsa*), perhaps more extensively planted than any other tree as an ornamental evergreen, does not fulfil in this country the promise of its earlier growth. At first the trees make rapid headway, and are of a dense habit, which, in favorable localities, is retained for a good many years; but, long before they reach maturity, they more generally become bare in appearance, and in no way equal to the white spruce (*Picea alba*) of Northern New England, which for ornamental planting, for wind-breaks, or hedges, should always be preferred. The native white ash (*Fraxinus Americana*) cannot be equalled here, either in beauty or utility, by any other of the family, and must not become superseded by the European ash (*Fraxinus excelsa*). Of the lindens, the American (*Tilia Americana*) is for us a finer tree than the European (*Tilia Europœa*), the fragrant blossoms of which are its recommendation to special favor; and the Southern linden (*Tilia heterophylla*), not yet introduced into cultivation, may prove a valuable accession in this vicinity. For New-England plantations no foreign maple can compare with the sugar-maple (*Acer saccharinum*) or even the scarlet maple (*Acer rubrum*). If the beautiful autumnal tints of the American maples were the only points in their favor, this would be sufficient reason for their retention in place of the foreign species; for they are in their greatest beauty at a season when all else is dull and sombre.

The European maples most frequently planted in Eastern New England are the sycamore-maple (*Acer Pseudo-Platanus*) and the Norway maple (*Acer platanoides*). The former proves of little value for ornamental or economic purposes; but the latter, when planted in vicinity of the ocean, makes a fine tree, and flourishes as well, perhaps, as any native species. In the interior the foliage of this tree often becomes brown as the season advances; and the trees are subject during periods of drought to the disfiguring attacks of the red spider. The Norway maple, however, surpasses in the beauty of its abundant flowers all American maples. The only European oak much planted here is the English oak (*Quercus robur*), a near relative of our white oak (*Quercus alba*), but for us inferior to it in every way. The English oaks which grow here look, at their best, but poor and cramped compared with the American species; nor do they promise to ever attain in this country the great age for which in Europe they are famous: indeed, the life of an English oak here in New England rarely exceeds fifty years.

In addition to the white oak we have, at least, ten other species to select from, all differing in foliage and habit sufficiently to satisfy the most capricious arboriculturist. Of the oaks not found in our own immediate region, the overcup-oak (*Quercus macrocarpa*), or, as it is in some places called, the burr-oak, the pin-oak (*Quercus palustris*), and others growing in adjacent States, are perfectly hardy, and should be more extensively planted. The burr-oak is more valuable, perhaps, than our white oak for certain mechanical purposes, as the wood in the ground resists decay longer, probably, than that of any American species.

Comparisons might be continued between American and European trees. We might compare the walnuts and beeches of the Old and New World, and arrrive at the same conclusions, or the American chestnut with its European representative; but it is hardly necessary to extend these comparisons further.

The examples already given will direct attention to the fact, that, while there is at hand a supply of trees in every way better adapted for plantations in New England, the European species most nearly related to them are far too generally planted in their stead. Our nurserymen should pay more attention to this subject, and produce a supply of trees better adapted to the needs of the climate and soil; for, after all, it is to the nurseries that the majority of persons must resort for the plants they need; and the want of knowledge on the part of most buyers prevents them from making a judicious selection for their plantations. It is therefore important that the proprietors of nurseries should be persons of wide information, and scrupulously careful in their dealings. Until very recently the American nurseries contained few or none of the trees of the Alleghany region just spoken of, and therefore these are too seldom seen in cultivation.

Of the more common New-England species not previously mentioned, we have the hickories, sturdy clean trees, with, in many cases, a desirable fruit and valuable timber; the elms, of which the white elm (*Ulmus Americana*), in a moist rich soil, arrives at a majestic maturity unsurpassed by any of our trees; the birches, some of which (the most beautiful) are not so long lived as could be desired; the cherries; the sassafras; the tupelo (*Nyssa multiflora*), a tree not half appreciated with its glossy summer foliage and brilliant autumn tints; the hornbeams; and, of the lower-growing species, the witch-hazel (*Hamamelis Virginiana*), with its flowers in November conspicuous as being developed after the leaves have fallen; the elders; hawthorns, of several varieties, with fine large blossoms and brilliant fruit; the sumachs; the viburnums, many of which are of remarkable beauty; and the dogwoods, seldom cultivated to any extent, yet containing among them the *Cornus florida*, one of the most desirable of small trees, which gives beautiful and conspicuous flowers, bright-red fruit, and brilliant autumn foliage. In the heath family (*Ericaceæ*) are the kalmia, cletha, rhododendron, azalea, and a host of shrubby species, which are often re-imported from European nurseries, where they are known as the "American plants." All these are perfectly hardy, and no trial is necessary to assure us of the fact. Besides these, we may add from the Alleghanies — that great storehouse from which, as has been already pointed out, we can draw so varied and so valuable additions — the cucumber-tree (*Magnolia acuminata*) and a number of lower-growing members of the same genus; the box-elder (*Negundo aceroides*); the locusts; the honey-locust (*Gleditschia triacanthos*); and the fringe-tree (*Chiananthus Virginica*), with which we are already familiar; the yellow-wood (*Cladrastis tinctoria*), often called virgilia; the red-bud (*Cercis Canadensis*); the sorrel-tree (*Oxydendrum arboreum*); the Buckeyes; the Kentucky coffee-tree (*Gymnocladus Canadensis*); the persimmon (*Diospyros Virginiana*), whose edible fruit will ripen perfectly well in the New-England climate; the black walnut

(*Juglans nigra*), now becoming so scarce, that, on the ground alone of the value of its wood, it should be more extensively planted, as should the butternut (*Juglans cinerea*) from our own region, which is capable of making a fine shade tree, and producing a most valuable wood for the cabinet-maker. The Western catalpa, but recently distinguished from the Southern species, which has long been cultivated here, besides bearing very beautiful and conspicuous flowers, is probably one of the most valuable of our timber trees, the wood resisting decay to a very remarkable extent. Enough has been said already to show that American are, for our purposes, generally superior to foreign trees; but there are foreign trees too, which, for certain situations, possess advantages over any of their American relatives. The European larch is a better timber tree in New England than the closely allied American species. It is possible, too, that trees of wide geographical range have a more elastic constitution and greater power of adaptability to the different conditions of life, and are thus better able to support changes of climate and soil. Such a case is that of the English elm (*Ulmus campestris*), which generally thrives in the city streets of Eastern New England, withstanding the drought and smoke better than the allied American elm, which only reaches its greatest perfection in alluvial river meadows or in most springy soil. The same might be said of the white willow (*Salix alba*), which is one of the most common of all introduced trees. This tree and the English elm have naturally very extended geographical ranges, the elm extending through Europe and Siberia to the Pacific; while the willow is found growing in the Old World over the greater portion of the north temperate zone. Of foreign trees, too, the ailanthus, often unnecessarily discarded on account of the odor of its male flowers, will produce better wood, it is said, on poorer soil, and in more exposed situations, than any other tree which can be grown in our climate. The ailanthus is a native of the northern provinces of China, a region from which we are led to expect most excellent additions to our list of ornamental and useful trees. For all economic planting in New England, native trees are, with these few exceptions, the best; but, for those who intend making extensive ornamental plantations, it will be desirable to add variety to their collections of native trees by the introduction of exotic species; and the question naturally arises, Where are we to look for such additions? Great and expensive mistakes have been made in the past by neglecting to study the conditions under which any exotic species flourishes naturally. Many attempts have been made, and much money wasted in the struggle, to acclimate in the East the trees of the Pacific forest, and always with the same result, — a total failure.

The great black current of the Pacific Ocean produces a climate for Oregon similar to that of Ireland and England, and very unlike our own. So, as might have been expected, the trees of the Pacific forest, which fail entirely in Eastern America, succeed perfectly in Western Europe, where, of late years, they have been largely introduced. Had the conditions under which these trees grew been carefully observed, and a practical application made of the result, no such attempt would have been made to cultivate them in a climate like ours, excepting in those experimental gardens, which, if arboriculture is ever to attain the dignity of an exact science, must always be kept up in every country, either through private enterprise and interest, or in public institutions endowed for the purpose of such special research. Where, then, shall we go in search of additional species? As the corresponding coasts of continents are found to possess similar floras, it is natural to expect that the best results would be obtained for us from plants taken from the region of Mantchuria, Northern China, and Northern Japan. Indeed, we find that there are many indigenous species common to the seacoast floras of both continents. Among such are the mountain maple (*Acer spicatum*), the speckled alder (*Alnus incana*), a hemlock quite nearly like our own Eastern hemlock, and a white birch: there are barberries, species of rhus, the fox-grape (*Vitis Labrusca*), spiræas, and a large number of woody and herbaceous plants common to both floras. It is important to consider the latitude in which the Asiatic plants naturally grow. It is, of course, as useless to expect that a plant from South-eastern Asia should flourish in the latitude of New England, as that one from our own Southern States should find itself at home on Mount Washington. But the plants from the southern coast of China and Japan will thrive in our South-eastern Atlantic States. The camellia has already become spontaneous in some parts of South Carolina; and the pride-of-China (*Melia Azederach*) has thoroughly established itself in nearly all the Southern States; while the ailanthus is gradually gaining a foothold throughout the Middle States and the South.

So far as experiments go, it is proved that the region of Eastern Asia is the one, and only one, to which we are to look for any further extensive additions to our plantation. For years our gardens have been enriched by a host of plants from China and Japan. The Chinese wistaria, more elegant than our native species, and the early-flowering magnolias, have already found their way into almost every garden; the wigelia and the deutzia are hardly less common; while the Chinese honeysuckle flourishes here in cultivation more vigorously than any native species.

The Chinese tamarix, a larger and better tree than the European species most frequently seen in cultivation, has proved during thirty years perfectly hardy; the akebia, with its curious dark-purple blossoms, has long been a favorite ornament in gardens; and the Japanese woodbine has certainly met with the welcome it deserves.

Most of the plants thus far mentioned are quite familiar, and flourish in nearly every garden, in company with the dicentra, Japanese lilies, peonies, and roses. The guiko-tree (*Salisburia adiantiflora*) has been long enough in cultivation to be satisfactorily tested for our region. This singular conifer produces a fruit containing a seed the size of an almond, which the Japanese consider a great delicacy, and which would readily find a sale in our markets. Several of these trees which have reached maturity in this country have already perfected fruit, among them one at Central Park in New York.

Various other trees from Eastern Asia may be found in botanical gardens and in the grounds of those who have been fortunate and wise enough to obtain them. Nearly all such give promise of success, and, when they become more easily attainable, are likely to be extensively planted, as they deserve. Many of these are evergreen conifers from Japan, and include the umbrella-pine (*Sciadopetis verticillata*); a larch (*Larix leptolepis*) of great beauty and rapid growth·

the beautiful hemlock (*Tsuga Japonica*); several spruces and pines, two of which (*P. parviflora* and *P. Koriensis*) are nearly related to our white pine: another (*P. densiflora*) is occasionally met with in cultivation, where it is wrongly called *P. Massoniana*, the name belonging to a species from Southern China, which, although probably hardy in our Southern States, could not be expected to thrive here in New England. Then there are the retinosporas, closely allied to our white cedar, of which there is an endless variety, many being quite dwarf, and possessing great beauty of foliage and form; and the juniper (*J. Sinensis*), which has a compact habit, and is of a fine blue-green color. Of Japanese shrubs which are likely to become common in our gardens as they are better known, are *Azalia mollis*, perhaps the most beautiful of all flowering shrubs; the single kerria; the rhodotypus; several spiræas; the plums; several species of rose; and, perhaps most desirable of all, the *Viburnum plicatum*, with flowers which resemble, but far surpass, the old-fashioned snowball. Among the trees there is the chestnut too, which seems to be hardly more than a variety of the Old-World species; the walnut (*Juglas Sieboldii*), nearly related to our butternut; and many others. From Mantchuria has come a walnut bearing its fruit in clusters more than a foot in length; a maple with deliciously fragrant blossoms; plums; an elder; an elm which hardly has a superior in beauty among exotic trees; the *Cladrastis Amurensis*, nearly related to the yellow-wood of the Kentucky forests; several barberries; and another very desirable tree, the *Phellodendron Amurense*, which belongs to the family of sumachs, and is now fairly tested in the New-England climate. From Northern China we have a birch; a maple; the flowering apples; a hawthorn; the white-barked pine (*P. Bungeana*), the common coniferous tree of that region; *Prunus Mume; Cedrella Sinensis*, a near relative of the ailanthus, with fragrant yellow blossoms, and a wood valuable for cabinet-work; the hawthorn-leaved raspberry; the exorchorda, a little-known but very beautiful plant; the idesia, a tree interesting to botanists as being the only representative of its family (the *Buxineæ*) that we may hope to cultivate successfully, and which is already in cultivation in Massachusetts, where it promises well. There are still other trees from the same region, which will no doubt prove perfectly hardy: among such are the Mantchurian linden, several maples, oaks, and magnolias, an ash, and two spruces. It should not be forgotten that from Southern Japan and China many species not hardy at the north may be introduced to our South-Atlantic coast, where the *Paulonia imperialis*, a tree valuable both ornamentally and on account of its excellent timber, already flourishes, even resisting the winter as far north as Providence, R.I.

The Chinese and Japanese have cultivated flowers and trees longer than any other people: they are, particularly the Japanese, ardent lovers of nature, and possessed of strong æsthetic tastes. It is not surprising, therefore, that their gardens are filled with rare and beautiful specimens of plants, and that all varieties that are interesting should have been carefully preserved. From these gardens we have already received many fine plants, especially the numerous dwarfed evergreens and the varieties of the beautiful Japan maples. Although Eastern Asia is the only region from which any extensive additions to our forest flora may be expected, yet there are other regions, of restricted limits, where we may still find many species for cultivation in New England.

From the region of the Caucasus we obtain two of the best spruces (*Abies Nordmaniana* and *Picea orientalis*), and the beautiful and perfectly hardy *Pterocarya fraxinæfolia*, a curious Old-World ally of our New-England hickories.

Success may be expected with plants from Turkestan, and it is possible that certain local influences may, in other parts of the world, produce, in limited regions, a climate not unlike our own, whence we may obtain a few additions to our collections. Such a region may possibly be found among the Himalayas or Thibet.

It has but recently been discovered that the horse-chestnut is a native of the Balkan Mountains, it having been introduced into Europe, by the way of Constantinople, in 1615, whence it came to America. As might be expected, the tree flourishes here fairly, doing better in cooler situations, near the water, than when it is exposed to the hot sun and droughts of the interior towns, where the foliage often becomes brown and disfigured.

As has already been stated, the Douglas fir, when raised from seed collected in the Rocky Mountains, is here in New England perfectly hardy. This fact indicates another region to which we may look for additions to the list of American trees valuable for New-England planting. From these high interior mountains, the flora of which is indeed remarkably poor in arborescent species, we have obtained fully half a dozen trees which promise the most excellent results even in our climate, — a result not, perhaps, very surprising, as many eastern species reach these mountains, there finding their western limit, and thriving side by side with some of the peculiar forms of the Pacific forests, thus proving a certain slight analogy between the climate of New England and that of the south Rocky Mountains.

Of these Rocky-Mountain trees, two deserve particular notice. The blue Rocky-Mountain spruce (*Picea pungens*) is a tree of rapid growth, great hardiness, and of a peculiarly charming blue-green color. This tree has been widely tested in Eastern Massachusetts during the last eighteen years, and specimens nearly fifteen feet high may now be seen there of unsurpassed beauty. This tree is perfectly hardy in the most exposed situations, and grows with great rapidity. It is, in its young state, remarkably compact in habit, and will form, it is confidently expected, a valuable hedge-plant. The second of the Colorado trees to which your attention is called is the Douglas fir already mentioned. This tree, — both as a subject for ornamental planting, and in its home, the West, — as a timber tree, is perhaps unequalled by any coniferous tree. The trees first raised here from Colorado seeds are perhaps fifteen feet high, and show by their vigorous and rapid growth an indication that the species can adapt itself to our climate and soil. The Douglas fir is the most interesting and valuable of all exotic trees recently introduced into Massachusetts; and, should it be found in the future that it is capable of producing here as valuable timber as that yielded by this tree in its native habitat, its introduction will be worth many millions of dollars to the State.

For more than a hundred and fifty years public-spirited citizens have been experimenting with exotic trees in different parts of the country; and, if we know now what trees to plant and what to avoid, it is because such experiments have been and are being made. But science is long, and human life is short, too short to successfully undertake experiments which, to be truly conclusive, must often extend through generations of human life.

Such work will be more systematically, and therefore more satisfactorily, performed in public institutions, which may be expected to continue certain lines of research from generation to generation, and where the duration of experiments will not depend on the pleasure or on the life of the individual man.

The country is to be congratulated, that, in pursuance of this object, and others relating to arboriculture, Harvard University has established the Arnold Arboretum, which contains some hundred and twenty-eight acres of land, quite variable in character, a portion of the well-known Bussey Farm in Roxbury, near Boston. The location is such, that the results of experiments there made will be of special value to New England, and of general interest to a large portion of the whole country. The arboretum is yet in its infancy, having been commenced only in 1874; so that, excepting the older trees, of which there are many already upon the estate, the majority of species are hardly more than nursery specimens, which, pending certain arrangements between the arboretum and the city of Boston, have not as yet been planted in their proper places. The work of the arboretum is therefore largely in the future. It is proposed, as soon as possible, to plant out along the main roadway the various orders of trees and shrubs in botanical sequence, both native species and those of foreign introduction, including all their varieties; so that any one not possessing a special botanical knowledge may at a glance comprehend the classification, and see by direct comparison the plants which best endure our climate. Among the many plants cultivated, of course, some will prove failures; and it is part of the work of the arboretum to show by living illustrations what to avoid, as well as what to select.

In fact it is intended to make the arboretum a living museum, to which the nurseryman, the gardener, and the private land-owner may resort for trustworthy information regarding all trees and shrubs, and save themselves the cost of personal experiments and the delays caused by an unfortunate selection. The collection of living plants at the arboretum is already richer in species than any other American collection, and is continually being increased by a system of exchanges with similar institutions in other parts of the world. Here, too, experiments are made with the seeds of plants taken from widely different localities, with the hope, as has already been shown in the case of the Douglas fir, that additions may be made to our list of hardy trees, not through what is known as acclimatization, but by using seeds procured from individual plants growing naturally under conditions as near like those of New England as can be found. Many interesting facts have already been obtained regarding the adaptability of plants to our climate.

Besides the collection of living plants, there has been established an herbarium, to be used as a reference collection for students and others in determining the names of species, or for comparison of plants from different localities. It is intended that this collection shall contain abundant specimens of every woody plant of the temperate zone, and all others that may be necessary to illustrate more fully any special family or group of plants. There has also been commenced a collection of tree products, which include the wood in its natural state with the bark, any interesting or valuable varieties, cones, nuts, and fruit generally of the trees, and any thing in the way of raw material which they may produce.

The collections of the arboretum are already assuming very considerable importance; and its museum, in connection with the living plants, will offer the student of trees, whether he wishes to study them in their scientific, their ornamental, or their economic aspects, facilities such as this country has not before offered.

In view, at no distant day, of the scarcity of forest-trees, it is well to plant for ornament those trees which, other things being equal, will be of the greatest economic value. Thus of the ashes, the white ash should be planted in preference to the red ash or green ash; the sugar-maple should be planted in preference to the white maple, the wood of which is inferior for all purposes; of the oaks, the burr-oak and white oak are either much superior to black oaks; and the red or Norway pine, previously spoken of as one of our most desirable forest-trees, should be planted rather than the more common pitch-pine.

In economic planting, too, it is well to remember that the most valuable trees are already scarce, or likely soon to be so; and that, by planting now such trees as black walnut, butternut, white pine, white ash, the hickories, etc., a certain profit will be made in the future.

It would not be proper, in treating of the general subject of natural planting, to pass by in silence, and without a protest, the pernicious and wasteful custom—an outgrowth of the bedding-out fashion in gardens—by which all sorts of variegated leaves or other abnormal forms of plants are given the first consideration. Nature is very indulgent, and permits the horticulturist to mould and shape her works into various forms. The perpetuation of these monstrosities and vagaries is no credit to those who pander to the false taste which encourages such productions, nor is it any credit to those who waste their time and money in planting these sickly evanescent forms where the healthy plant in its natural condition is every way preferable. Of course there must always be exceptions, and Nature has, in making a change of color, sometimes given us valuable contrasts, as in the case with the purple beech; but even the purple beech cannot be planted indiscriminately.

We have a long line of golden oaks, golden ashes, golden lindens, striped-leaved, silver-leaved, or golden-banded varieties, hideous to any lover of nature. Looking upon these sickly plants, each seems, by turn, more ugly than its neighbor. All should be sent to the rubbish-heap together, and permanent natural productions planted in their places. These plants are all the result of some constitutional weakness, an impeded or irregular distribution of juices of the plant, and, like all other abnormal forms, cannot be long-lived. The only thing that can be said in their favor is, that they will die naturally in a short time. Nor can much be said of that class of horticultural productions known as weeping trees. In a few cases beautiful and interesting, they have become absurd through their too frequent employment.

It is impossible, in the hour allotted for this paper, to more than outline the general spirit which should govern us in the selection of ornamental trees. Only a few examples are used in illustrating the sections into which the subject naturally divides itself, and hardly any thing can be said regarding the merits of particular species for the multitude of locally varied situations which will continually require attention and special study as the subject comes more into prominence.

It is only necessary, in conclusion, to call attention to the principal points which it has been the effort of this paper to present to your consideration: —

I. That, for planting in New England, our own New-England trees are, with few exceptions, the best.

II. That, in addition to the New-England trees, we can safely make use of the many beautiful and useful trees which abound in the forests of the Middle States and the Alleghany Mountains; and that to these Eastern species may be joined a few trees of unsurpassed beauty in the Rocky-Mountain region.

III. For exotic species with which to add variety and interest to a plantation, we must look to Eastern Asia rather than to Western Europe.

APPENDIX.

List of trees rarely cultivated in Massachusetts, and which should be more generally introduced. Such species as have not been thoroughly tested, but which, judging from the region in which they naturally grow, may be expected to succeed here, are marked by an asterisk.

NORTH AMERICAN.

Appalachian, other than Natives of Massachusetts, etc.

Magnolia acuminata. (Cucumber-tree.)
Magnolia cordata.
Magnolia Fraseri.
Magnolia macrophylla.
Magnolia Umbrella. (Umbrella-tree.)
*Tilia heterophylla.
Æsculus flava. (Sweet Buckeye.)
Æsculus glabra. (Ohio Buckeye.)
Cladrastis tinctoria. (Virgilia. Yellow-wood.)
Gymnocladus Canadensis. (Kentucky coffee-tree.)
Cercis Canadensis. (Red-bud. Judas-tree.)
Pirus coronaria. (American crab-apple.)
Cratægus cordata. (Washington thorn.)

Cratægus subvillosa. (Valley of the Mississippi.)
Liquidambar Styraciflua. (Liquidambar.)
Viburnum prunifolium.
Oxydendrum arboreum. (Sorel-tree.)
Diospyros Virginiana. (Persimmon.)
Halesia tetraptera. (Silver-bell tree.)
Fraxinus quadrangulata. (From Michigan, etc.)
Chionanthus Virginica. (Fringe-tree.)
Catalpa speciosa. (Western catalpa. Valley of the Mississippi River.)
*Ulmus alata. (Whahoo. Winged elm.)
Ulmus racemosa. (American cork-elm. Western States.)
Juglans nigra. (Black walnut.)
Carya sulcata. (Western shellbark-hickory.)
*Quercus heterophylla. (New Jersey, Delaware, etc.)
Quercus imbricaria. (Shingle-oak.)
Quercus macrocarpa. (Burr-oak. Overcup-oak.)
Quercus palustris. (Pin-oak.)
Quercus Phellos. (Willow-oak.)
Castanea pumila. (Chinquapin.)
Taxodium distichum. (Bald cypress.)
Picea alba. (White spruce. Northern America.)
Pinus Banksiana. (Gray pine. Northern America.)
Pinus pungens. (Table-mountain pine.)

From the Rocky Mountain Region.

Cratægus rivularis. (Interior mountain region between Rocky and Cascade Mountains.)
Populus angustifolia.
Abies concolor. (White fir.)
*Abies subalpina.
Pseudotsuga Douglasii. (Douglas spruce.)
Picea Engelmanni.
Picea pungens. (Blue spruce. Abies Menziesii of Colorado.)
*Larix occidentalis. (Northern Rocky Mountains and interior mountain region.)
*Pinus contorta, var. Murrayana.
Pinus flexilis.
Pinus ponderosa.

Exceptional Species from the Pacific Slope.

Rhamnus Purshiana. (Bear-berry.)
Acer circinatum. (Vine-maple.)
*Cratægus Douglasii.
*Pirus rivularis. (Oregon crab-apple.)
*Populus tricocarpa.
*Abies nobilis.
*Picea Sitchensis.

FOREIGN.

Japan.

Acer cratægifolium.
*Acer micranthum.
Acer polymorphum.
Acer rubinerve.
Acer Japonicum.
Negundo cassifolium.
*Phellodendron Japonicum.
Sophora Japonica.
Pirus Ringo.
*Pirus tomentosa.
Kœlreuteria Japonica.
*Zelkowa acuminata.
Idesia polycarpa.
*Fraxinus longicuspis.
*Platycarpa strobilacea.
Juglans Sieboldii.
*Quercus glabra.
Castanea Japonica.
*Betula Bhojhaltra.
*Betula coryrifolia.
Alnus Japonica.
Salisburia adiantifolia. (Ginkgo-tree.)
*Pinus densiflora. (Cultivated as Pinus Massoniana.)
Pinus parviflora.
Pinus Koriensis.
Sciadopetis verticillata. (Umbrella-pine.)
Tsuga Japonica.
Picea Alcoquiana.
Picea polita.
Chamæcyparis (Retinospora) filifera.
Chamæcyparis (Retinospora) obtusa.
Chamæcyparis (Retinospora) pisifera.
Chamæcyparis (Retinospora, garden varieties).
Larix leptolepis.

China and Mantchuria.

Magnolia conspicua.
Magnolia stellata.
Magnolia (garden hybrids and varieties).
Liriodendron. (An undescribed species from Northern China.)
Phellodendron Amurense.
Tamarix Chinensis.
*Tilia Mantchurica.
*Æsculus Chinensis.
*Acer Mono

Acer Tartaricum.
Acer Tartaricum, var. Ginnala. (Fragrant maple.)
Cladrastis Amurensis.
Gleditschia ferox.
*Gymnocladus Chinensis.
Cratægus orientalis.
Prunus Maacii.
*Prunus Mume.
Cedrella Sinensis.
Halimodendron argentium.
*Fraxinus Mantchurica.
*Pterocarya stenoptera.
*Quercus Mongolica.
*Betula Ermani.
*Betula Ulmifolia.
Juglans Mantchurica.
Taxodium (Glyptostrobus) Sinensis.
Pinus Bungeana.
Pinus Mantchuric
Juniperus Chinensis.
Pseudolarix Kæmpferi.

Siberia.

Caragana arborescens.
Ulmus pumila.
Picea obovata.

Turkestan.

Fraxinus potamophila.

Thibet.

*Pinus Gerardiana.

Caucasus

Acer lætum.
Zelkowa crenata.
Pterocarya fraxinæfolia.
Carpinus Duanensis.
Picea orientalis.
Abies Nordmaniana.
Abies Cilicica.

Europe.

Acer campestre.
Tilia argentea.
*Tilia dasystylis.
Fraxinus ornus.
Quercus Cerris.
*Quercus Panonica.

Carpinus Betulus.

Salix laurifolia.

Thuja Warriana. A garden variety of the North-American *Thuja occidentalis*, of English origin; known in the United States as "Siberian arborvitæ," and much hardier and in every way superior to the type.

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